



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005ID55B

Title: Evaluation of temporal variations of the nitrate concentrations in ground-water of the Ashton, Idaho area and potential causative factors.

Project Type: Research

Focus Categories: Nitrate Contamination, Water Quality, Non Point Pollution

Keywords: Nitrates, temporal variation, groundwater, non-point source, graduate research, Ashton

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: \$21,365

Non-Federal Matching Funds: \$45,733

Congressional District: 01

Principal Investigators:

Gary Steven Johnson

University of Idaho

Mark Lovell

Robert Smith

Abstract

Elevated nitrate concentrations have been identified in ground water in Fremont, Teton, and Madison counties, of eastern Idaho. The highest density of sampled wells with elevated concentrations are located near Ashton, Idaho. A few additional impacted wells are found down gradient, within five miles of the Henrys Fork of the Snake River. Water quality data from the USGS in Boise, acquired in March 2004, shows that 34 wells contained concentrations of nitrate-nitrogen that exceeded 10 mg/l. The maximum concentration of nitrates was observed in a well located near the Teton/Fremont county line.

The rural setting includes agricultural activities with both farming and cattle operations. Production of potatoes and grains are the main crops. Portions of the region are also experiencing population growth.

Analyses of the available water quality data shows that, of the wells where nitrate concentrations exceeded 10 mg/l, only three of the wells have more than ten samples; another five wells have five to six samples; five wells have three to four samples, and the remaining nineteen wells have only one or two samples. Data from nine of the wells shows higher nitrate concentrations in the early part of the irrigation season (June or July) and lower concentrations in early fall. This pattern is poorly defined however, due to the relatively few number of samples collected at different times of year. Only two wells showed a slight increase in the nitrate concentration during fall.

The infrequent historical sampling of wells provides an uncertain picture of seasonal variations and how that variation may be related to activities and events at land surface. To better understand these changes, it is proposed that a continuously monitoring probe be deployed within a well several weeks prior to the start of the irrigation season and continue sampling past the end of the irrigation season. Rather than capturing 'snapshots' on a three or four month interval, this method would allow the opportunity to measure changes in nitrate concentration corresponding to the beginning of the irrigation season, the initial flooding of the irrigation canals, and potentially other events. This would be supplemented by a series of monthly samples from other impacted wells in the area.

Correlation of changes (possibly rapid changes) in ground water nitrate concentrations with other events and activities would provide one component of a more comprehensive approach to understanding and resolving nitrate problems. This project would be performed in concert with additional related studies to be proposed to USDA, EPA and other funding sources. The additional proposals will include sampling by under-graduate students from BYU-Idaho and other interested schools. An integrated effort bringing students together from geology, chemistry, and agriculture would provide a unique learning experience. Students, with faculty oversight, would be able to participate in sample collection and analyses to monitor the behavior of the plume and collaborate with soil conservation districts to help evaluate effectiveness of BMP efforts.